

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Electronics		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Data Acquisition and Conversion Techniques		
Lecturer (for lectures)		Petrović D. Branislav		
Lecturer/associate (for exercises)		Nikolić S. Goran		
Lecturer/associate (for OFE)		Nikolić S. Goran		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Students familiarize themselves with the basic technique of converting signals from analogue to digital domain and vice versa, as well as acquiring practical knowledge about modern circuits for these purposes. Recognizing students with basic methods of acquiring electrical and non-electrical quantities. Getting to know basic sensor components and processing problems of their signals. Understanding the basic principles of integrating a complete data acquisition system.				
Course objectives				
Conversion methods. Application of converters. Basic characteristics of the sensor and data processing method. Realization of the system for data acquisition.				
Course outcomes				
Course outline				
Definition and basic structures of the data collection system. General measurement principles, data domains. Types of acquisition system. Basic building blocks of the system. Sensors and converters. Calibration and linearization techniques. Analog multiplexers, Signal conditioning. Encryption and quantization. Dosing Theory. Converters errors. Converters architecture (ADC, DAC, Sigma-Delta). Testing converters. Cross-coupling. Reference sources, clock signal generators. Examples of application of the system for collecting and conveying signals: Precision signal conditioning; Digital potentiometer; Digital audio; Digital video displays; Software radio; Direct digital synthesis. AD and DA converters and interfaces. User interfaces - Keyboards and displays. Telemetry.				
Theoretical teaching				
YES converters with weight and ladder resistant and capacitive network. ADC with successive approximation, Flash ADC, ADC with dual integration. Sigma - Delta ADC. VF converters. Sigma-Delta first-order converter. Temperature measurement a) thermocouple, b) NTC resistor, differential pressure measurement, Force measurement, analog and digital filtering, wireless temperature acquisition system.				
Practical teaching (exercises, OFE, study and research)				
Textbooks/references				
1	Teacher's Handwriting (in Serbian): Data Collection and Conversion Systems			
2	Data Conversion Handbook, Analog Devices			
3	Selected articles. Catalogs of known convertor manufacturers.			
4	Practical Data Acquisition for Instrumentation and Control Systems, John Park and Steve Mackay			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	1	0	0
Teaching methods				
Auditory instruction using computers and projectors. Basic examples of simulation of individual methods. Practical display of characteristic methods of signal conversion. Lectures. Practical exercises. Laboratory exercises. Homework. Colloquiums. Seminary work. Consultations.				
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures	10	Written exam		20
Exercises	15	Oral exam		20
Colloquia	20			
Projects	15			